

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 7]

[1924

XXXI.—NOTES ON THE PLANTS OF PATOS.

R. O. WILLIAMS.

Patos is a small island one mile and a quarter long by nearly a third of a mile broad at its widest part. In area it approximates to one hundred and seventy acres. It is attached to the Colony of Trinidad and Tobago, and is situated in the Gulf of Paria six and a half miles within the Boca Grande or Dragon's mouth. It is about two and three-quarter miles from the coast of Venezuela, and twenty-four miles from Port of Spain. The nearest island also associated with Trinidad is Chacachacare, about seven miles distant.

The climate of the adjoining Bocas islands is dry, the rainfall of Chacachacare being about fifty inches per annum. There is no rain gauge at Patos, but judging from conditions there, and from the type of vegetation, as well as from general information available regarding the island, it must be even drier than Chacachacare. The island is generally very rocky, and the soil poor and of a sandy nature. It is also hilly, the highest ridge being 350 feet above the sea level.

Patos is uninhabited except for two men whose duty it is to see that the British flag is hoisted daily on the flagstaff. In the moister months of the year, viz., July, August, and September, these men are able to grow some food crops such as corn and yams, but at the time of our visit, March 17th to 21st, 1924, which was the height of the dry season, there were no crops growing or attempts at cultivation.

The island is chiefly surrounded with precipitous cliffs, but on the southern side there are two little bays, either of which makes easy landing. Close to the water's edge in the more westerly of these two bays is situated the caretaker's hut, and much was my surprise on a previous visit in 1917 to find a fairly good specimen of the Baobab tree (*Adansonia digitata* L.) growing near by. This, I was told, had been planted by a

previous proprietor or warden, and probably came from the Botanic Gardens in Port of Spain. This tree is still there and has grown considerably. It is interesting to find an introduced tree on an outlying island, especially when three only of the same species are known to exist in Trinidad. A few coconut palms (*Cocos nucifera* L.) also grow near the water's edge in this bay, one very poor specimen of the lime tree (*Citrus medica* var. *acida*), a calabash tree (*Crescentia Cujete* L.), and the Barbados aloe (*Aloe vera* L.). Other than these no cultivated plants were seen.

Patos is a barren island on which cacti, terrestrial Bromeliads and an *Agave* form quite fifty per cent. of the flora. In fact the purpose of our visit on this occasion was to make Patos a collecting ground for these plants for planting in the West Indian Garden at the British Empire Exhibition and also at Kew. Quite close to the sea we observed in places the Manchineel (*Hippomane Mancinella* L.), a well-known Euphorbiaceous tree with poisonous milky sap; this was noticed to be bearing its small inconspicuous monoecious flowers. The white mangrove (*Laguncularia racemosa* Gaertn.) was also observed in places on the coast, and in one instance we noticed long structures like paper bags which we took to be birds' nests suspended from the branches. Mr. Urich determined these as the nests of Bombycine gregarious caterpillars from which the moths had already issued. *Sesuvium Portulacastrum* L. was also abundant in places near the shore.

The island is almost entirely covered with bush from twenty-five to thirty feet high except for a few acres in tall grass (Plate I). Interspersed with the bush are many kinds of cacti, the most conspicuous of all being *Lemaireocereus griseus* (Haw.) Britt. & Rose, which is scattered all about the hillsides down to the sea. This plant branches considerably, especially when injured by cutting or breaking, the branches being usually eight-angled and erect. The areoles are about one inch apart, and bear usually ten or eleven greyish spines of varying length up to about half an inch. In old specimens the plant forms quite a distinct main trunk which loses its angular nature and is brownish in colour. The flowers are two or three inches in length, and are borne towards the tops of the branches; the petals are greenish yellow, the outer ones tipped with red. The fruit is round and very spiny, not unlike a sea egg in general appearance. On ripening, the spines fall and it becomes red in colour, containing edible red pulp and a large quantity of tiny black seeds. The pulp is of good flavour, especially when iced; bats and birds are very fond of it. On the occasion of our visit in June, 1917, quantities of these fruits were ripe, but during our recent visit very few were found although there were large numbers of immature ones. Dr. Britton in Bull. Dept. Agric. Trinidad, xix, p. 86, regards Patos as the most eastern known station for this species, and states that it ranges along the Venezuelan

PLATE I.

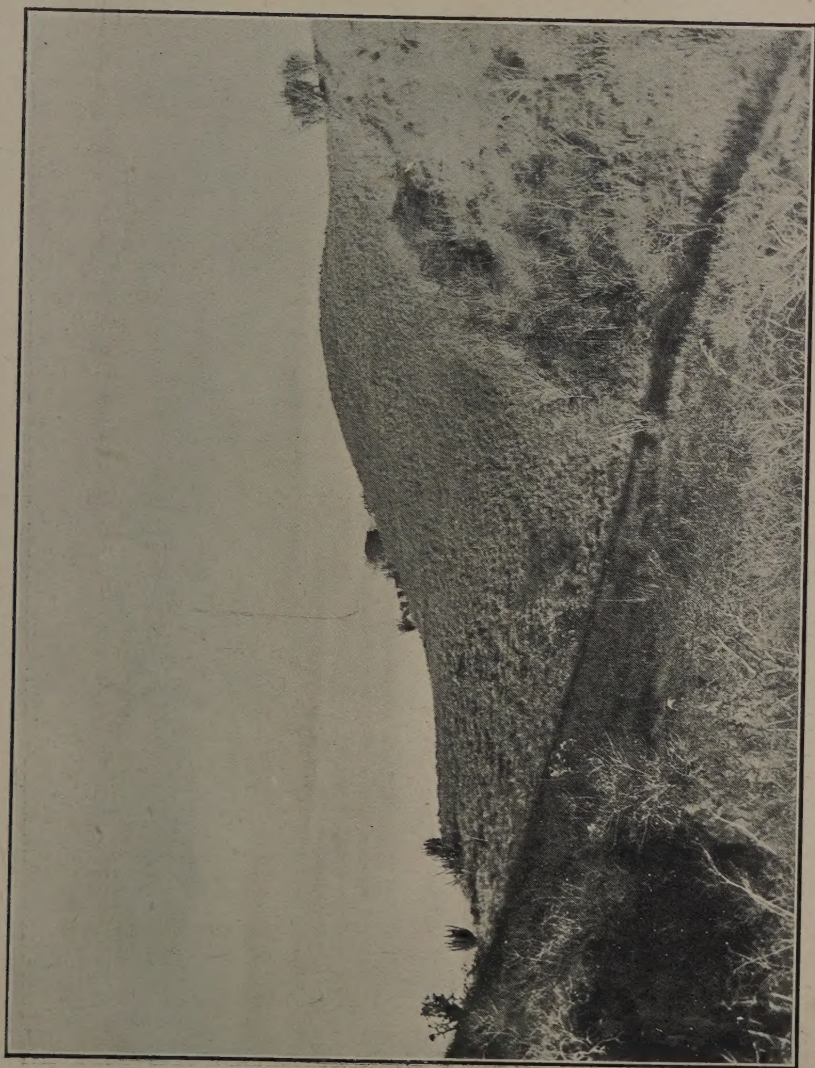


PLATE II.



coast, occurring on Margarita Island and on the Dutch Islands, Aruba, Curacao, and Bonaire; it is cultivated in many parts of tropical America northwards to Mexico. Occasionally this plant develops a distinctly red coloration of the stems and gives quite a pretty general effect even from some distance. There is no apparent reason for this, as this form was found scattered about the island amongst the typical *L. griseus*, and also occurs quite close to the sea.

Another fairly common cactus which forms quite large plants almost equal in size to the former is *Cephalocereus Moritzianus* (Otto) Britt. & Rose, a plant readily distinguished by its branches terminating in white woolly apices, the woolly substance sometimes extending down the branches for a distance of one or two feet (Plate II). Young specimens of this plant are very pretty, standing as they do perfectly erect and unbranched, somewhat widely separated in groups amongst the undergrowth. This species also is armed with formidable short spines of which there are about ten to each areole, often many more. The stem is eight-angled, and the areoles are about half-an-inch apart. It is not such a common plant on Patos as *L. griseus*.

To reach the flagpole from the bay one trails up and down a steep track over one ridge to the top of the one beyond. On the first ridge we erected our sleeping quarters by securing the lids of packing cases to horizontal rods nailed to four conveniently placed small trees. For our bed we made a bench of rods on top of which we placed a bed of dry grass, quantities of which were found amongst the bush near by. The grass appeared to be Guinea grass (*Panicum maximum* Jacq.), but it was too dried up to make a proper diagnosis. The trees used for uprights we were told by the men were known as "Greenheart", but it was apparently an entirely different plant from the S. American "Greenheart" (*Ocotea Rodiei* Mez.). The tree was just bursting into growth, but no flowers were found [Herb. No. 10713, not identified].

Our first work was to clear the undergrowth, which in this situation consisted almost entirely of *Opuntia Boldinghii* Britt. & Rose (Plate III). Although the branches were succulent and easily cut, the roots and older stems of the plants proved very tough. We saw much of this plant in flower, the flowers being shaded pink and yellow and rather showy. It is almost devoid of spines, but the areoles bear numerous stiff hairs or bristles which prove very troublesome if the plant is handled without leather gloves. The fruit is round, longer than broad, about one inch in diameter and containing red pulp and flattish, rather large, black seeds. It is edible but cannot be compared as a dessert fruit with *Lemaireocereus griseus* on account of the difference in the size of the seeds. The fruit also produces large quantities of tiny bristles.

Closer scrutiny amongst the *Opuntias* in this vicinity showed one possessing orange-coloured spines of varying length up to

two inches, several being borne on each areole; but unfortunately it was not found in flower. It was not nearly so common as *O. Boldinghii*, and we had to be content merely to collect cuttings for sending to the British Empire Exhibition [Herb. No. 10732, possibly *O. Wentiana* Britt. & Rose].

Following the trail to the flagpole one finds amongst the undergrowth large quantities of a slender usually seven- to nine-angled cactus densely covered with spines of varying length up to one inch. The areoles are about one-quarter of an inch apart. This is *Cephalocereus Smithianus* Britt. & Rose. It is usually erect, growing to a height of ten to twelve feet, often more or less trailing and rooting where its branches touch the ground, throwing up more branches and forming an almost impenetrable thicket.

Before the top of the ridge is reached the track widens out and the bush becomes a little higher. A few fair-sized trees of Gommier (*Bursera gummifera* L.) were seen. On the edge of the clearing around the flagpole are to be found a few plants of the large erect cactus (*Cereus hexagonus* L.). The individual branches of this species are by far the largest of any cactus we found on Patos. The specimens we collected were four-angled, and the tops of the branches were almost spineless, although at the base long, slender spines are developed and the stem was noticed to be five-angled. This plant was far from common, and except for the few plants found around the flagpole only two or three other specimens were seen.

*Cactus caesi*us (Wendl.) Britt. & Rose, the Turk's Cap Cactus, is found plentifully on Patos, and this was one of the principal reasons for making Patos the collecting ground for cacti for the British Empire Exhibition (Plate IV). It has not been recorded from any of the other Bocas Islands: I have personally searched some of the barren parts of Chacachacare, Monos and Gasparee for it without success. On Patos it is found only on exposed places usually near the sea. One such spot is on the slope immediately above the westerly bay: at the present time this area is devoid of practically all bush, and from the distance appears as a pure growth of grass. This barren part of the island may be the result of past attempts at clearing with a view to cultivation, or of bush fires. On close inspection it is found to be very rocky, and on the highest points near the cliff the Turk's Cap cactus is very abundant. In some cases this plant grows on the bare rock, in others amongst grass, but scarcely ever amongst high bush.

This cactus is more or less globular, about one foot or so in height, and has about fourteen strongly armed ridges. The areoles bear about nine very strong spines which are from a half to one inch in length. At the apex is produced the "Turk's Cap," the woolly and bristly structure termed the cephalium. It is usually unbranched, but we came across one small colony in the south-eastern part of the island where

PLATE III.

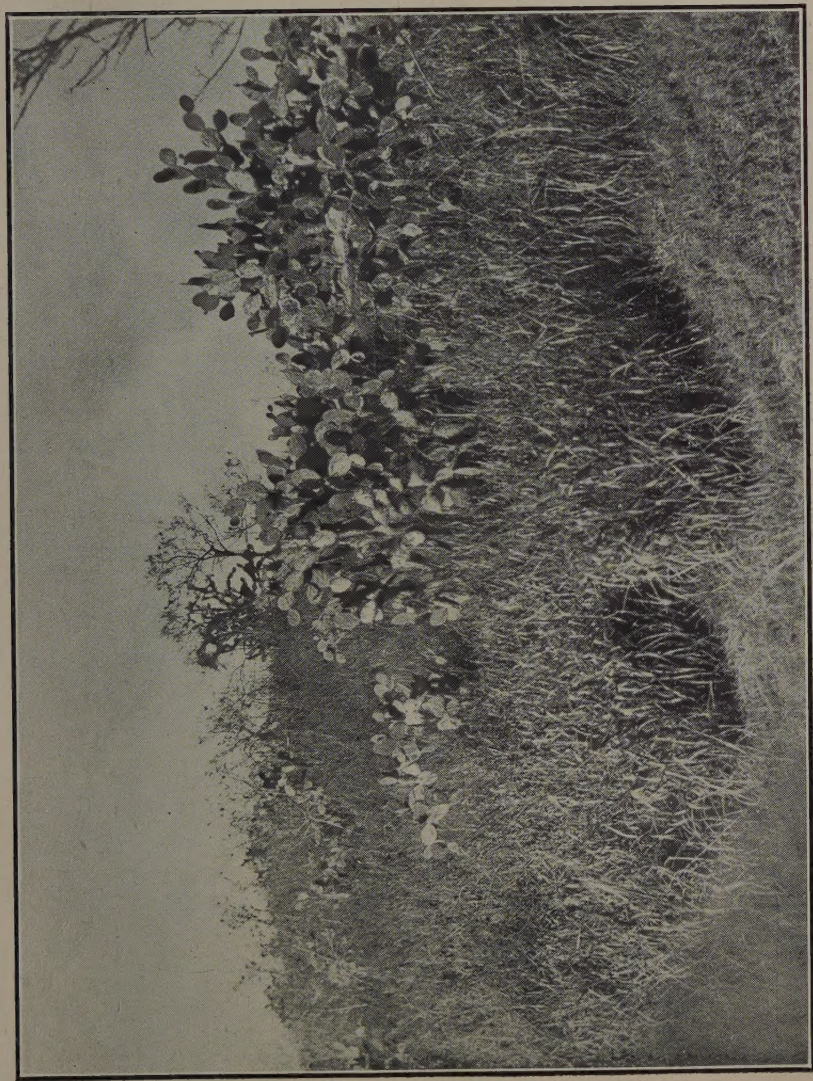
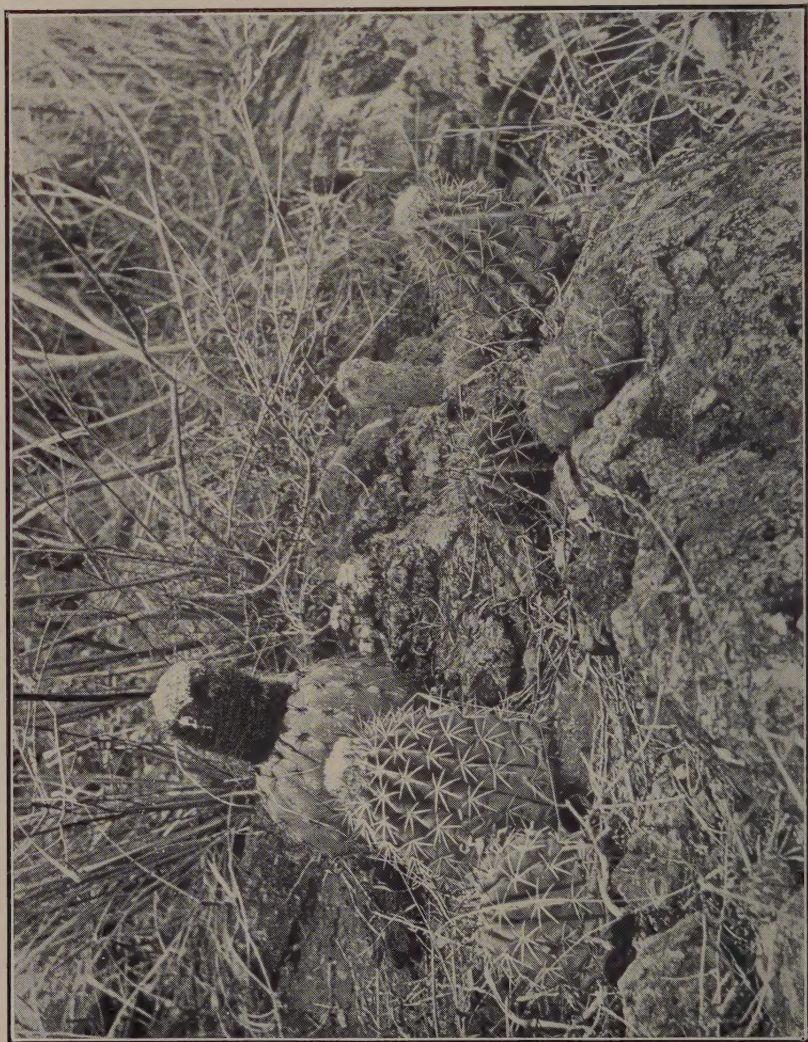


PLATE IV.



the plants had branched at the top, and in one instance as many as fifteen secondary branches were formed.

It is very evident that this plant requires plenty of exposure and prefers the vicinity of the sea, as few plants were found scattered amongst the undergrowth, whilst in certain exposed parts, notably the south-western extremity of the island, they grew in great abundance. Dr. Britton states that Patos is the most eastern known station for this plant and that it ranges westward along the Venezuelan coast into Colombia; it was first collected in La Guayra.

The flowers are small, deep pink, expanding from amongst the wool of the cephalium between one and two p.m., closing before next morning. The fruits are reddish with a blunt apex and pointed at the base. They push through the cephalium and drop during the course of about two days. The tiny black seeds are embedded in white pulp.

I collected two other representatives of the *Cactaceae*, one a long and at first perfectly erect and rigid triangular plant with areoles of whitish, brown-tipped spines. Usually nine spines are produced at each areole, the longest of which are as much as two inches long and the others shorter and of varying length. This appears to me to be *Acanthocereus pentagonus* (L.) Britt. & Rose.

Another triangular species was apparently *Hylocereus Le-mairei*, a night-blooming *Cereus*; only small specimens were seen and those not in flower. I had, however, collected this plant on Patos in 1917. This species was growing close to the water's edge; instead of being concave between the angles it was swollen and almost rounded. The same characteristic was noticed in what was apparently the same species collected on the rocks of Chacachacare in 1922. The plant is spiny, two or three short, brown spines being produced at each areole.

Most of the cacti on Patos appear to seed abundantly but the distribution of many of the species is largely increased by the breaking down of the branches, which when resting on the ground form adventitious roots and numerous erect branches which eventually develop into plants. The Turk's Cap cactus would appear to be almost entirely propagated by seeds.

Patos abounds in goats, the original stock having been placed on the island many years ago. They now run wild and from a botanical point of view do much damage to the undergrowth.

On pursuing our way beyond the flagpole we had to push through thick vegetation, and it was only possible to get through by following the goat tracks, not only on account of the quantity of cacti but largely because of the terrestrial Bromeliads and an *Agave*, pure associations of which were frequently met sometimes extending to an area of several acres. The worst offender in this respect was *Karatas humilis* E. Morren, a Bromeliad with orange-coloured leaves and dark brown spines about one-tenth of an inch long and recurved in different

directions. This is a very conspicuous plant from the sea, and forms quite a pretty feature of the landscape. I only saw one specimen beginning to produce an inflorescence, and in this the crown of leaves surrounding it was a beautiful reddish colour. A large number of these in flower at the same time must make a gorgeous sight. This Bromeliad may be easily uprooted, but owing to the density of its growth and the sharpness of the spines, it was necessary to make a detour in the path when one came to a mass of this plant. Even the goats avoid it and in no case did we see any damage caused to it by these animals.

The same remarks are true of another terrestrial Bromeliad (*Gravisia aquilega* Mez). This has stout, broad leaves with short, recurved brown spines and erect flower-spikes about two feet in length. The plant is conspicuous on account of its large, showy, deep pink bracts which are as much as eight inches long and two inches broad. At the time of our visit this Bromeliad was flowering profusely and added a considerable touch of colour to the undergrowth.

The only *Agave* noticed was *A. evadens* Trelease, and this was very common all over the island, growing even quite close to the sea. On the several ridges to the east of the island we found it very plentiful, especially in the more rocky situations. It was not so difficult to pass through as the Bromeliads, the cutlass having greater effect upon it, but the strong terminal spines were not pleasant, and in many cases we had to retrace our steps and find other tracks. This *Agave* flowers abundantly and is quite pretty when producing its erect "pole", on which are dispersed the bright yellow flowers. Iguanas are very plentiful on Patos, and on one occasion we saw one at rest on the "pole" of an *Agave*, and we were fortunate in getting it to remain still long enough to take a photograph, although a somewhat distant one. Immediately I had made one exposure it reversed its position to tail upwards and I was able to get another. These Iguanas are curious reptiles; the first intimation of their presence is usually a sudden crash, due to their clumsy manner of descending from the trees when alarmed.

With the exception of the *Agave* and the Bromeliads all the low undergrowth in this part of the island has been eaten by goats, and at this time of the year they must find great difficulty in getting food. We came upon a herd of about one hundred fine animals in good condition which made off with a great stampede down the hillside as soon as they sighted us.

Tecoma stans Juss. is a very common shrub on Patos, but it was practically leafless at this time of the year and only a few of its bright yellow flowers were seen. When conditions are more suitable for its blooming, it must be a pretty feature of the vegetation.

Of evergreen trees few were seen: amongst these were *Lignum Vitae* (*Guaiacum officinale* L.), the foliage of which was a brilliant green even at this time of the year. This tree was

interesting as a source of supply of large, bright green snakes (*Oxybelis fulgidus*) for my colleague Mr. Urich, and he was able to capture several. Another interesting evergreen plant was one which somewhat reminded one from a distance of the evergreen oak. [Herb. No. 10,719, not identified.]

Pithecolobium Unguis-cati Benth., the bread-and-cheese plant, was noticed to be flowering, and the Poui (*Tecoma serratifolia* Don.) was also fairly common but not in flower at this time.

Few epiphytic or parasitic plants were seen, only one epiphytic Bromeliad being noticed in any quantity. Of orchids I found none, although in 1917 I collected a fine specimen of a terrestrial orchid, probably *Cyrtopodium Andersonii* R. Br., possessing erect pseudo-bulbs twenty-four inches in length on which the old leaf-bases are developed into sharp spines.

To obtain a more extended idea of the flora of Patos it would be necessary to return in the wet season. It would also be interesting to see to what extent the undergrowth recovers during the moist weather from the destruction by goats.

A fair quantity of other herbarium material was collected. This is entered under Nos. 10,719 to 10,731 and has been identified at Kew as follows.

MALVACEAE.

Bastardia viscosa H.B.K. A low shrub (10720).

STERCULIACEAE.

Melochia tomentosa L. Shrub 2 ft. high, foliage strongly scented (10723).

ZYGOPHYLLACEAE.

Guaiacum officinale L. (10711).

LEGUMINOSAE.

Pithecolobium Unguis-cati Benth. (10714).

COMBRETACEAE.

. **Laguncularia racemosa** Gaertn. (10715).

CACTACEAE.

Opuntia Boldinghii Britt. & Rose (10738).

O. Wentiana Britt. & Rose ? (10732).

Cephalocereus Moritzianus Britt. & Rose (10737).

C. Smithianus Britt. & Rose (10735).

Lemaireocereus griseus Britt. & Rose (10740).

L. sp. (10736).

Acanthocereus pentagonus Britt. & Rose (10734).

Hylocereus Lemairei Britt. & Rose (10733).

Cactus caesius Britt. & Rose (10739).

COMPOSITAE.

Trixis frutescens P. Browne. Shrub 3-4 ft. (10730).

SAPOTACEAE.

Sapotacea. Small evergreen tree, without flowers or fruit (10727).

EBENACEAE.

Maba inconstans *Griseb.* Shrub 8-10 ft. (10729).

SOLANACEAE.

Lycium americanum *Jacq.* (10722).

SCROPHULARIACEAE.

Capraria biflora *L.* Shrub 2-3 ft. (10724).

BIGNONIACEAE.

Tecoma stans *Juss.* (10712).

EUPHORBIACEAE.

Jatropha urens *L.* Shrub 3 ft. (10726).

Croton sp. Shrub 2-3 ft. (10731).

Ditaxis Fendleri *Pax & K. Hoffm.* Low straggling shrub. (10725).

BROMELIACEAE.

Gravisia aquilega *Mez* (10716).

GRAMINEAE.

Panicum sp. (10717).

Cynodon Dactylon *Pers.* (10718).

Eragrostis sp. (10721).

EXPLANATION OF PLATES.

I. Types of vegetation on Patos. Grass among which the Turk's Cap Cactus grows, and low bush.

II. **Cephalocereus Moritzianus** *Britt. & Rose*, on Patos.

III. **Opuntia Boldinghii** *Britt. & Rose*, on Patos.

IV. The Turk's Cap Cactus, **Cactus caesius** *Britt. & Rose*, on Patos.

XXXII.—ADDITIONS TO THE INDEX KEWENSIS: III.*

The botanical results of the French scientific Mission to Mexico and Central America, 1865-66, were published in two volumes, the *Cryptogamae*, by Nylander, Bescherelle and Fournier, appearing in 1872, and the *Gramineae*, by Fournier,

* Continued from *Kew Bull.*, 1924, 171.

in 1886.* The latter volume, however, was actually in print as early as June 1880, and clean sheets were sent by Fournier to several botanists, including Bentham†, who received a set in March 1881 and presented it to the Kew Library.

The long delay in publication was attended by unfortunate results. The new generic names proposed by Fournier were published by Bentham‡, either as synonyms (*Achaeta*, *Apogonia*, *Chaboissaea*, *Cinnastrum*, *Crypsinna*, *Dimorphostachys*, *Helleria*, *Peyritschia*) or as accepted names (*Baucha*, *Gouinia*, *Trichloris*). Nearly all the new specific names were published by Hemsley§, some as accepted names, and other as synonyms, but in most cases *without any description*. Hemsley cited the pages of Fournier throughout, and Fournier's species were originally cited in the manuscript of the Index Kewensis from Fournier's Enumeration. During the preparation of the manuscript for press, however, it was discovered that the Enumeration was not published until 1886, and the references to it were accordingly deleted|| except in a few genera, e.g. *Andropogon*, *Aristida* and *Cenchrus*, where they were inadvertently retained in addition to the references to the Biologia. A few of Fournier's names which were missed by Hemsley (*Brizopyrum uninervium*, *Chondrosium Drummondii*, *Cinnastrum miliaceum*, *C. poaeforme*, *Eatonia densiflora*) and some others which he cited in synonymy (*Apogonia glabrata*, *A. ramosa*) or mentioned incidentally (*Arundinella robusta*, *Triathera gracilis*, *Uniola effusa*, *U. Muellieri*, *Vilfa confusa*, *V. densiflora*) were omitted from the Index Kewensis, but were inserted in Supplement I. in the following manner: "*Vilfa confusa* Fourn. Gram. Mex. 1881 (1886) 101." This is misleading, as it implies that the work is dated 1881, whereas the only date on the title-page is 1886.

Except in a few cases where Hemsley repeated short diagnoses given by Fournier, the new species taken up by him from Fournier appeared as *nomina nuda* in the Biologia, and the references given in the Index Kewensis are consequently incomplete.

Fournier's new genera and species are now being inserted in Index Kewensis, Suppl. VI., with references to the *descriptions* in Fournier's Enumeration. Pending the appearance of the Supplement it seems desirable to give a condensed list of the names with the corresponding page numbers of Fournier's work. The new genera described by Fournier are indicated by the word "(descr.)".

* Cat. Libr. Brit. Mus. (Nat. Hist.) ii. 604.

† Hackel in Bot. Centralbl. 1886, xxviii. 232; Bentham Correspondence, iv. 1459.

‡ Journ. Linn. Soc. Bot. xix. 14-134 (1881); Benth. et Hook. f. Gen. Pl. iii. 1074-1215 (1883).

§ Biol. Centr.-Amer. Bot. iii. 475-588 (1885).

|| The period covered by the Index Kewensis was "from the time of Linnæus to the year 1885 inclusive".

FOURNIER, MEX. PL. ENUM., GRAM. (1886).

- Achaeta* (descr.) 109
 geniculata 109
 plumosa 109
Anachyris
 setosa 2
Apogonia (descr.) 63
Bauchea (descr.) 87
Berchtoldia
 oplismenoides 41
Chaboissaea (descr.) 112
Chusquea
 Bilimeki 132
 carinata 132
 Liebmanni 132
 spinosa 131
Cinnastrum (descr.) 90
Crypsinna (descr.) 90
Deyeuxia
 gracilis 106
Dimorphostachys (descr.) 13
 adoperiens 15
 Botterii 14
 Drummondii 15
 Ghiesbreghtii 16
 Langei 14
 paspaloides 14
 Schaffneri 15
 variabilis 15
Diplachne
 patens 148
Dissanthelium
 sclerochloides 112
Eleusine
 Gouini 146
 inaequalis 145
 rigidifolia 146
 scabra 145
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 Berlandieri 89
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 Buchingeri 88
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 robusta 89
 Virletii 88
Eragrostis
 caudata 115
 hirta 115
 limbata 116
 maxima 114
 pauciflora 117
 Virletii 116
Festuca
 aequipaleata 125
 Liebmanni 124
Gouinia (descr.) 103
 polygama 103
Guadua
 aculeata 130
 flabellata 131
 inermis 129
 intermedia 130
Gymnopogon
 longifolium 144
 Virletii 144
Gymnothrix
 bambusiformis 48
 distachya 48
 Grisebachiana 48
 mexicana 48
Helleria (descr.) 128
Helopus
 gracilis 13
Hymenachne
 Gouini 36
 patula 37
Ichnanthus
 mexicanus 34
Leersia
 Gouini 2
Leptochloa
 Liebmanni 147
 stricta 147
 Virletii 147
Megastachya
 breviflora 119
 corymbifera 119
 fasciculata 120
 Gouini 119
Muehlenbergia
 acutifolia 86
 Botterii 85
 Bourgaei 86
 breviseta 83
 dubia 82
 exilis 84
 Liebmanni 83
 Schaffneri 85
 setarioides 84
Oplismenus
 angustifolius 40
 chondrosioides 39
 depauperatus 38
 Liebmanni 38
 Thiebauti 39
Panicum
 ambitosum 30
 Arundinariae 25
 Bourgaei 25
 Buchingeri 30
 conchatum 25
 cordovense 26
 disciferum 19
 expansum 26
 Francavillanum 25
 Ghiesbreghtii 29
 Gouini 28
 ichnanthoides 30
 inaequale 17

- Kunthii 29
 Langei 23
 leiophyllum 20
 Liebmannianum 33
 Lindeni 29
 rhizophorum 31
 Ruprechtii 21
 Schlechtendalii 22, 30
 squamatum 18
 Torreyi 28
 vicarium 20
 Virletii 29
 Pappophorum
 bicolor 133
 mexicanum 133
 Paspalum
 cordovense 9
 cymbiforme 5
 Hartwegianum 12
 Karwiniskii 8
 Liebmanni 11
 lineare 12
 minus 6
 pauperculum 10
 planifolium 10
 Schnaffneri 7
 squamulatum 11
 Sumichrasti 11
 Virletii 12
 Pennisetum
 multiflorum 49
 Perieilema
 ciliatum 93
 setarioides 93
 Peyritschia (descr.) 109
 Poa
 Bourgaei 113
 Setaria
 auriculata 43
 cirrosa 43
 effusa 42
 falcifolia 44
 Grisebachii 45
 Jurgensenii 42
 laevis 45
 Liebmanni 44
 longipila 47
 pseudoverticillata 43
 streptobotrys 41, 47
 Spartina
 Gouini 135
 Spodiopogon
 foliatus 52
 vaginatus 53
 Stipa
 brevicalyx 150
 chapulcensis 74
 cirrosa 75
 editorum 75
 erecta 75
 Grisebachii 74
 Liebmanni 76
 linearifolia 73
 subulata 75
 Virletii 75
 Trachypogon
 Gouini 66
 Muelleri 66
 Trichloris (descr.) 142
 fasciculata 142
 pluriflora 142
 Trisetum
 bambusiforme 108
 gracile 108
 interruptum 108
 nivosum 107
 paniculatum 109
 Virletii 108
 Uniola
 lugens 123
 Uralepis
 mutica 110
 Vilfa
 Grisebachiana 98
 sacatilla 101
 Zeugites
 Hartwegi 121

XXXIII.—FRESH-WATER ALGAE OF THE WEST FALKLANDS.

COLLECTED BY MRS. ELINOR F. VALLENTIN.

Shortly after my return from the Falklands in 1911 I gradually distributed my collections to the various specialists who very kindly undertook to report on them.

The fresh-water algae were accepted by Mr. William West, who unfortunately died in May, 1914. On 4th August of that year I received the following note from Prof. G. S. West . . .

"In going through my late father's papers, I have come across several letters from you relating to some algae from the Falkland Islands. All the algae collections are now in my hands, and should you desire it, I will myself report on them, although it will be at least two years before I can promise to work through them . . .". I wrote at once and gratefully accepted Prof. G. S. West's kind offer, and there the matter rested. Then followed the news of his lamented death some years later.

Most fortunately, some time afterwards, DR. NELLIE CARTER of Birmingham University, most kindly came to my assistance, and on sending her some fresh material, that originally sent to Mr. William West having been lost, she drew up the following lists, writing to me on the 26th January, 1921, as follows:—

"I am sending you a list of the algae which I hope will be of some use to you. It was compiled chiefly from notes left by W. West, and all the additions and remarks added by myself I have initialled. I have by no means exhausted all the material in the tubes you sent me, but in the case of microscopic algae one finds something not previously noticed in almost every dip from the tube, and it is possible to go on almost *ad infinitum*." "As I have so much other work on hand, and it would probably be some time before I could prepare a compilation suitable for separate publication, I thought it advisable to send you the list just as it is at once . . ."

FLAGELLATA.

Dinobryon Sertularia, Ehrenberg.

Lake near Settlement, Teal River.

MYXOPHYCEAE.

Microcystis sp.

Port North Lake, and lake near Settlement, Teal River.

Glæothice sp.

Ponds on track to Teal River.

Coelosphaerium Kützingianum Nägeli.

Lake near Settlement, Teal River (N. C.).

Distrib.—Europe, Africa, America.

Merismopedium glaucum (Ehrenberg) Nägeli.

Lake near settlement, Teal River (N. C.).

Merismopedium sp.

Lagoon, Byron Sound.

Oscillatoria sp.

Lagoon, Byron Sound, and Port North Lake.

Oscillatoria limosa (Roth) Agardh.

Shallow Bay.

Phormidium sp.

Locality not stated.

Lyngbya sp.

Horse Paddock, Shallow Bay.

Lyngbya Lagerheimii (Moeb.) Gomont.

Pond near Teal River (N. C.).

Distrib.—Europe, America.

Nostoc sp.

Moor Pools and Horse Paddock, Shallow Bay.

Nodularia spumigena Mertens.

Shallow Bay (Volvox tube) (N. C.).

Distrib.—Europe.

Rivularia sp.

Moor Pools, West Falklands.

BACILLARIACEAE.

Fragillaria sp.

Common.

Synedra sp.

Lake near Settlement, Teal River and Port North Lake.

Navicula (various species).

Common.

Stauroneis Phoenicenteron Ehrenberg.

Lagoon, Byron Sound.

Gomphonema sp.

Common.

Nitzschia sp.

Shallow Bay (Volvox tube).

Swirella ovalis Brébisson.

Lagoon, Byron Sound.

Swirella cardinalis Kitton.

Pond, Saunders Island (N. C.).

Swirella sp.

Shallow Bay.

CHLOROPHYCEAE.

Volvox aureus Ehrenberg.

Shallow Bay.

Distrib.—Europe, Asia, America.

Tetraspora sp.

Moor Pools, West Falklands.

Gloeocystis gigas (Kützing) Lagerheim.

Lake near Settlement, Teal River (N. C.).

Distrib.—Europe, America.

Eremosphaera viridis De Bary.

Fresh-water pool in camp.

Distrib.—Europe, America.

Kirchneriella obesa (West) Schmidle.

Lagoon, Byron Sound.

Distrib.—Europe.

Scenedesmus quadricauda (Turp.) Bréb., var. *maximum* West.

Rush Pond, east corner of Byron Sound (N. C.).

Distrib. (of type).—Europe, Asia, America, New Zealand.

Scenedesmus sp.

Fresh-water pool in "Camp".

Pediastrum Boryanum (Turp.) Meneghini.

Lagoon, Byron Sound, and pond on Saunders Island.

Distrib.—Europe, Asia, America.

Pediastrum angulosum (Ehrenberg) Meneghini, var. *rugosum* Racib.

Pond on Saunders Island.

Distrib.—Europe.

Vaucheria sp., sterile.

Rush Pond, East corner of Byron Sound (N. C.).

Prasiola sp.

Rush Pond and Port North Lake.

Geminella minor Heering.

Rush Pond, Byron Sound.

Ulothrix subtilis Kützing.

Lake near Settlement, Teal River and Rush Pond, Byron Sound (N. C.).

Ulothrix sp.

Common.

Binuclearia tatrana Wittrock.

Reed Pond, Byron Sound. (The filaments were only about half their usual size. Breadth of cells 3.5–4 μ ; length 4.5–5 μ N. C.).

Distrib.—Europe.

Chaetophora pisiformis (Roth) Agardh.

Common.

Distrib.—Europe, America.

Microthamnion strictissimum Rabenh.

Rush Pond, Byron Sound.

Distrib.—Europe.

Mougeotia, several species sterile.

Common.

Zygnema stellinum (Vaneher) Ag. var. *subtile* (Kützing) Kirchen.

Reed Pond, Byron Sound (N. C.).

Distrib.—Europe, America.

Zygnema sp., sterile.

Common.

Spirogyra tenuissima (Hass.) Kützing.

Reed Pond, Byron Sound (N. C.).

Distrib.—Europe, America, New Zealand.

Spirogyra, several species sterile.

Common.

Closterium Venus Kützing.

Rush Pond, Byron Sound (N. C.).

Distrib.—Europe, Asia, America, New Zealand.

Closterium sp.

Moor Pools, near Horse Paddock.

Cosmarium sp.

Port North Lake; another species from the pond on Saunders Island.

Bulbochaete sp., sterile.

Lake near Settlement, Teal River (very abundant).

Oedogonium, several species sterile.

Common.

A very interesting form of this genus was observed in which the filaments were coiled in a regular spiral. The specimens occurred in a plankton collection from a pond near the Teal River, the chief constituent being a sterile species of *Bulbochaete*. Amongst this were the minute spirals of *Lyngbya Lagerheimii*, and coiled filaments of a very narrow species of *Oedogonium* (length of spirals about $360\ \mu$; diameter of spiral $25\text{--}35\ \mu$; distance between turns $60\ \mu$; diameter of cells $4\text{--}5\ \mu$; length about $30\ \mu$). Spirally twisted filaments of *Mougeotia* and *Ulothrix* are already known to occur in plankton, and the same phenomenon is also known in certain *Myxophyceae*, but, as far as I know, coiling has not been previously observed in *Oedogonium* (N. C.).

Botryococcus Braunii Kützing.

Byron Sound Lagoon.

Tribonema sp.

Rush Pond, Byron Sound.

This species may be new, it corresponds with *T. utriculosum* Kützing, in its dimensions, but has very much thicker walls (N. C.).

XXXIV.—ON THE FLORA OF THE GALLIPOLI PENINSULA.

W. B. TURRILL.

The Peninsula of Gallipoli, the Thracian Chersonesus, now again under Turkish sovereignty, has considerable botanical interest, from its position near to Asia Minor. It forms one of the remaining portions of the Aegean land area across which was the connection between the floras of Asia Minor and the southern parts of the Balkan Peninsula. Till recently few persons visiting the Gallipoli Peninsula had interested themselves in its flora, and though the present paper is concerned only with the western portion it is not surprising that there are many records which add to our knowledge of the distribution of species. A brief account of the visits of botanists to or near the Dardanelles will serve to indicate how the Gallipoli Peninsula has been neglected.

Tournefort sailed through the Dardanelles in 1701, but apparently did not land to collect plants. In the English edition of his "Voyage into the Levant," London, 1718, Letter xi.

pp. 340 seq., he gives an account of the Straits and of the land on each side as seen from the boat.

Pehr Forsskål visited the Dardanelles in 1761. I have found no evidence that he collected on the European side. According to C. Christensen in Dansk Bot. Arkiv. iv. 3. 6 (1922) he sailed from Constantinople on Sept. 11 and stayed at Borghas (Burgaz), a little distance inland on the Asiatic side, from Sept. 15 to 17. It was probably at this time that he collected *Delphinium aconiti* described from his material by Linnaeus, Mant. 77 (1767).

Aucher-Eloy must have passed several times through the Dardanelles in his journeys to and from Constantinople. Thus in his "Voyages en Orient," edited by le Comte Jaubert and published in 1843 after his death, there are references in the first part, pp. 9-10, and in the second part, p. 371, to passages through the Straits. I feel certain from evidence on some sheets of plants collected by him and preserved at Kew that he, and apparently also his part-time companion Coquebert de Montbret, collected in the area, but whether on the European or Asiatic side or on both sides I do not know.

In 1839 Grisebach travelled extensively in the Balkan Peninsula and N.W. Asia Minor and his itinerary is fully described in his "Reise durch Rumelien und nach Brussa" (Gottingen, 1841), while the plants he collected are listed, often with excellent descriptions, in "Spicilegium Florae Rumelicae et Bithynicae" (Brunsvigae, vol. i. 1843; vol. ii. 1844). On 18th May Grisebach left Constantinople and travelled along the northern coast of the Sea of Marmara, via Silivria to Rodosto. From thence skirting the Tekir Dagħ he crossed inland to Ainijik and to Malgara and Kesan, arriving on the coast again at Enos on May 25. Although he thus missed the peninsula of Gallipoli entirely, his accounts of the vegetation along the route he took are very instructive and are to be found in the fifth chapter of the first volume of his Reise (pp. 102-143).

In the Kew Herbarium there are some specimens with labels indicating that they were collected by F. Calvert, in 1867, near the Dardanelles, but exact localities are not given, and I do not know whether or not any were collected in Gallipoli.

In 1883 P. Sintenis made a notable collection in the Troas on the Asia Minor side of the Dardanelles. An excellent set of specimens of this collection is in the Kew Herbarium. The plants were determined by Ascherson, but so far as I have ascertained no general account of them was published, though some are quoted in the last (fifth) volume of Boissier's Flora Orientalis, 1884 (Monocotyledons, Gymnosperms and Vascular Cryptogams) and in the Supplement (1888) by R. Buser. Apparently Sintenis crossed over one or more times to the European side of the Straits and collected a few specimens around Maitos (Maidos), at least.

Dr. N. Stoianoff, now Professor of Botany in the Faculty of Agriculture, Sofia University, spent 5 months (Dec. 1912 to April 1913) in and around the Tekir Dagħ, just to the east of

Gallipoli Peninsula. In his account in the Yearbook of the University of Sofia, viii-ix., 1914, he records 286 plants. Though his observations deal essentially with the spring flora only, there is evidently a close connection between the flora of this district and that of the Gallipoli Peninsula, as would naturally be expected.

A few plants from the Gallipoli Peninsula are mentioned by E. Jeanpert in his paper "Enumération de Plantes d'Orient" in Bull. Mus. Nat. d'Hist. Nat. 1920, 666.

The names of about 20 plants collected in Gallipoli Peninsula by Lt.-Col. F. R. Durham are contained in my paper "A Contribution to the Flora of the Nearer East" published in the *Kew Bulletin*, 1922, p. 291, while in the volume for 1921, p. 128, I tentatively recorded *Gonocytisus angulatus* from Cape Helles. Further material now received confirms this identification.

Many plant collections have been made in Eastern Thrace, chiefly around Constantinople and Adrianople, and there are also a number of scattered accounts of the flora of Western Thrace, that is, west of the Lower Maritza. The following papers should not be missed by students of the Balkan Peninsula flora: I. K. Urumoff, Neuc und seltene Pflanzen Bulgariens, in Mag. Bot. Lap. 1920, 33; B. Davidoff, Edine Cvatobere be Zapadna Trakia (A botanical collection made in Western Thrace) in Trudove na Bulg. Prirod. Druz. viii. 43 (1915) (Works of the Bulg. Soc. Nat. Sci.); F. Markgraf, Botanische Kriegsbeobachtungen in Thrazien in Verhandl. Bot. Vereins Prov. Brandenburg, 1920, 8; B. Stefanoff, Beleshki varku rastitelnostata na Zapadna Trakia (Notes on the Flora of Western Thrace), in Godishnik na Sof. Univ. xv.-xvi. 1918-1920, Sofia, 1921 (Yearbook of the Univ. of Sofia); and I. K. Urumoff, Prinosa za Florata na Belomorska Trakia (A contribution to the knowledge of the flora of Western Thrace), in Spisanie na Balg. Akad. na Naukita xxviii., 1923 (Publications of the Bulg. Acad. of Science).

The collections on which the present paper is based have been made as follows:

Capt. C. M. Ingoldby	610 specimens.
Mr. R. Kett	154 ..
Lt.-Col. F. R. Durham, C.B.E., M.C.	120 ..
Plants in cultivation at Kew, or received as living specimens at Kew, grown from seeds, bulbs, etc., from Gallipoli (about)	20 ..
Total ..	904 ..

A number of plants from Gallipoli Peninsula are now in cultivation at Kew, but most of them have not yet flowered and are therefore not included here. Our best thanks are due to the collectors for the great trouble and interest they have taken in

making the collections and for their generosity in presenting them to Kew.

I also wish to thank Mr. Pugsley for help with the *Fumaria*, Mr. C. E. Salmon for help with the *Plumbaginaceae*, Mr. Dykes for naming *Iris mellita* and the tulips, Mr. Wilmott for identifying



Anthyllis Hermanniae, and Prof. Chodat for the loan of specimens from Boissier's Herbarium and information regarding Boissier's journey in 1842.

OBSERVATIONS AND NOTES BY CAPT. INGOLDBY.

From January 19th, 1923, to August 25th, 1923, I was stationed on the Gallipoli Peninsula, and quartered during the greater part

of that time at Kilia. The force was scattered in small detachments over the Peninsula, affording opportunity of transit to places otherwise difficult of access. Except for the few military roads communications on the Peninsula are of an elementary nature and local transport consists of little but donkeys. I was unable to reach as far to the north-east as the town of Gallipoli, or to the great "backbone" ridge along the north-west coast.

General Account.—The Peninsula of Gallipoli consists, as is well known, of a main part, about 28 miles long. This is sub-conical with the apex at the isthmus, about 3 miles in width at its narrowest part, and the base, stretching from Suvla to Kilia Bay, about $11\frac{1}{2}$ miles across. From the lower third of this base a smaller triangular spit of land projects, widest and highest at its base, towards the main bulk of the Peninsula, and narrowing to its apex at Helles with points westwards; its long axis is parallel to that of the main part.

A strip of flat, low land, somewhere above 100 ft., separates these two portions, running from just S. of Gaba Tepe to Kilia Bay.

Similar low ground is found at the isthmus. Undoubtedly from time to time these two areas, as also the flats around and to the N.E. of Suvla, have been submerged by the sea, the Peninsula having thus been converted into two islands.

The great bulk of the main part of the Peninsula is hilly, averaging perhaps 300–600 ft., rising occasionally to 1000 and in one place to over 1300 ft. The main ridge runs along and close up to the Aegean Coast, which in consequence is precipitous in practically its whole length.

A series of parallel valleys, narrow, with more or less steep, thickly scrubbed sides, running at right angles to the long axis, and ending in the Dardanelles, break up the hill mass on the eastern side. These valleys are for the most part well watered and fertile. Their position is indicated on the accompanying map by the 100 ft. contour lines. Corresponding areas of low ground on the Aegean side of the Peninsula are drier and less fertile; as is the strip from Suvla to Kilia. These no doubt correspond to more or less naked marine sediments (*vid. inf.*); the surface soil of the valleys of the Dardanelles side is alluvial.

The area between 100 and 500 ft., considerably the greater portion of the Peninsula, consists of open rolling ground, stony and poor, and covered with grass and low scrub.

Above 500 ft. the hill slopes are commonly thickly scrubbed. At places where the hill slope is steep, as on the Aegean side of Sari Bahr and a curious small area at the head of the Maidos Valley, the ground is cut up into nullahs of light crumbly soil, showing rapid erosion. *Capparis sicula* is about the only plant which flourishes on this last-mentioned little area. Most of the coast is more or less steep. The few beaches on the Aegean coast are too well known to need mention.

Cultivation is confined to the Dardanelles valleys and certain areas of the low ground to the west.

Localities.—The locality of a specimen in the collection is indicated by (1) the name of the nearest village or camp (e.g. Kilia, Maidos), (2) of a hill top (e.g. Biyich Tepe, 1141), (3) of a valley (Karakova Dere), or (4) of an ill-defined area of some extent without very definite place-names other than those of military origin; examples are Helles and Anzac. Of these last, the former includes the area from the beach of World Bay to the cliff tops north of the Gully, up to Fusilier Bluff; the latter, Anzac, includes Anzac Cove and Brighton Beach up the slopes of Sari Bahr. Suvla indicates the flat ground in the neighbourhood of the Salt Lake.

Vegetation.—Of forest proper there is none. A small wood of tall pines (*P. halepensis*), near Kilid Bahr, cypress groves round the Turkish cemeteries, and a few olive groves, include almost all the trees of any size on the Peninsula, except for various fruit trees in the neighbourhood of the villages and a few scattered small oaks (usually *Quercus aegilops*), and an occasional poplar in the valleys.

Types of Vegetation and their Distribution.—*Type I.*—Mainly above 500 ft., but extending down the sides of the steeper valleys on the Dardanelles side and on the Sari Bahr is brushwood, often dense and grown up to 10 or 15 ft. in many places. This is composed in various proportions of oak, *Arbutus*, pine, *Cotoneaster*, juniper, myrtle, and a large number of others.

Type II.—Grass and low scrub (ankle to knee deep) covers the open hillsides (100 to 500 ft.) of poor, stony soil which make up the greater part of the Peninsula, especially in its western half. The shrubs are of great variety, including a dwarf form of holly oak (*Q. coccifera*), *Cistus*, *Coridothymus capitatus*, *Astragalus trojanus*, juniper, *Erica*, *Thymelaea*, etc. Occasional bushes of *Paliurus* and *Quercus aegilops* rise to several feet: there are patches of holly oak growing up to 6 or 7 feet.

Type III.—Fairly rich meadow land in the eastern valleys, with a thick tangle of growth along the contained stream; this latter vegetation consists of small trees and bushes of *Platanus* and *Salix* supporting a dense mass of climbers and creepers—*Rubus*, *Periploca*, *Clematis*, *Althaea*, *Convolvulus*, etc. Towards the mouth of some of the streams there are patches of marsh.

Type IV.—Salt Marsh. Mainly around the Salt Lake and the sea fringe of Kara Kova Dere. *Limonium*, *Goniolimon*, a few species of *Centaurium*, *Frankenia*, *Polygonum maritimum* and characteristic sedges and grasses.

Type V.—Sand Dunes, as at Suvla, between the salt marsh and the pebbly beach. Characteristic plants are sedges, various *Eryngiums*, *Pancratium* and *Marsdenia erecta*.

Encroaching on this and fringing the beaches everywhere is a

nondescript tangle of grasses and composites with bushes of *Astragalus*, *Paliurus*, *Capparis*, holly oak, etc.

Type VI.—Beach. Usually pebbly. *Eryngium*, *Matthiola*, *Salicornia*, *Cakile*, etc.

Climate.—The winter from late October to early March is wet and cold, though there is rarely more than a degree or so of frost. Frequent squally days of sleet, rain or snow alternate with short periods of bright sunshine. Spring is warm with a high sunshine rate. It may be said to last till the end of April. Little rain falls from April to October. The summer is moderately hot, dry, with an almost constant N.E. wind.

Flower Sequence.—The sodden hillsides of winter offer little promise of the superb displays of flowers which succeed one another from March far into the summer. A few *Colchicum* plants in late February, increasing in number, with species of *Ornithogalum*, *Myosotis*, and a few *Ranunculaceae*, etc. in early March herald the spring outburst, when great areas are covered thick with many coloured anemones (*A. coronaria* and, a little later, *A. pavonina*), *Adonis*, *Gagea*, while close on a score of orchids, *Romulea*, various *Boraginaceae*, *Leguminosae*, *Styrax*, honeysuckle, crocuses, irises, and superb Euphorbias occur in profusion in suitable localities. The spring flowers last but a short time, being replaced towards the end of April, as the land dries, by clusters of flax, innumerable bushes of rock roses (*Cistus salviifolius* and *C. villosus*) etc. On the hillsides are poppies in great profusion, Chrysanthemums, many fine legumes (*Astragalus*, *Vicia*, etc.), *Legousia*, *Gladiolus*, corn cockle, fine Glauciums, *Anchusa italica*, and sundry Echiums, hollyhock, *Dianthus*, to name a few of the more striking.

By July the hillsides are burnt and brown again and even in the valleys most of the water is diverted to crops. Even so the countryside is bright everywhere with a rich flora of composites, mostly xerophytic, from the clumps of a superb blue chicory on the flats to the hillsides covered with a great variety of *Echinops*, *Centaurea*, *Carduus*, etc. Great mulleins. Delphiniums, and *Nigella* occur all over the flat ground and lower hillsides, with bushes of Spanish broom and the sweet-scented *Gonocytisus* and huge clumps of *Vitex agnus-castus*. Sea lavender, stocks, and *Pancratium* occur abundantly at sea level in suitable places.

I have to express my indebtedness to Major W. M. T. Martin, R.F.A., who gave me much assistance in collecting in the Angadere area and in the vicinity of Gaba Tepe.

GEOLOGY.

An account of the geology of the Dardanelles district is given by T. English in the Quart. Journ. Geol. Soc. 1904, and some particulars are mentioned by J. Cvijić in Peterm. Geogr. Mitt. Erg. xxxiv. 383 (1908). A more recent paper by W. Penck on the geological structure and history of the Gallipoli Peninsula will be found in Zeit. Ges. f. Erdk. 1917, 30.

It is generally agreed that the Aegean Sea is of recent formation, geologically speaking, and Suess even suggests that man may have witnessed its formation. There is not, however, uniformity of opinion concerning the origin of the Dardanelles. Petermann [Das Mittelmeergebiet 18, 21, 44 (1914), etc.] and Cvijić (l.c.) refer to it as an erosion valley, through which a river formerly flowed, but which, after the sinking of the Aegean continent, was overflowed by the sea. In the north of the Gallipoli Peninsula there are sandstones and marly slates of the Upper Cretaceous period; above these, but farther to the south, there follow 6000 m. of Tertiary sediments, which in the Straits are crowned by Sarmatic (marly, sandstone, conglomerate) and Pontic (limestone) deposits, together 150 m. in thickness. These Sarmatic-Pontic beds are nearly or quite horizontal, whilst the older rocks are folded, and on the north coast of the Peninsula form a hilly landscape up to 400 m. in altitude. The strike direction of the folding corresponds nearly to the long-direction of the Peninsula, and Lt.-Col. Durham has suggested to me the existence of a big fault running parallel with this. A young Pliocene (Levantine) elevation of the land gave origin to the erosion furrows and fluvatile rubble. A still younger disturbance (light folding and faulting) accompanied the invasion of the sea into its present basin and moulded the existing relief in its general features.

According to Penck the Straits lie almost in the axis of a great synclinal fold and in a rift valley (Grabenbruch), which is sunk in it, and follows a special zone of destruction of the horizontal layers. It seems most probable that both tectonic foldings, elevations and sinkings, and also river and marine erosion have helped in the formation of the Dardanelles as we find them to-day.

ECONOMICS.

The Gallipoli Peninsula, so far as it is utilized by the inhabitants, is entirely pastoral and agricultural. As in most parts of Turkey, methods are antiquated, results unsatisfactory and yields low. The south-west part of the Peninsula is in general much less inhabited than the north-east, the farms and villages being smaller and less frequent. Maize is one of the chief agricultural products, but tobacco and cotton are also grown. Many of the villages have vines around them, but the vineyards have deteriorated recently, partly owing to the compulsory emigration of the Greek inhabitants. Phylloxera has attacked the vines in many parts of Thrace. Mulberry trees for silkworm culture occur frequently, and some 10 to 15 years ago efforts were made to increase the industry. The results were not satisfactory, and even before the war it was reported that the inhabitants of the Gallipoli Peninsula had been uprooting their mulberry trees. Flocks of sheep and goats are pastured in some of the valleys and on many of the hills and help to prevent tree growth. Lack of water accounts for the uninhabited nature of the higher parts of the country.

FLORISTIC COMPOSITION AND GEOGRAPHICAL DISTRIBUTION.

The species recorded in this paper from Gallipoli Peninsula number 472, and there are 23 additional varieties named. The species number is made up as follows :

Dicotyledons	390
Monocotyledons	79
Coniferae	2
Filices	1
	<hr/>
	472
	<hr/>

While no pretence is made that the collections are exhaustive it is felt that together they are representative, and that sufficient species have been collected to make some generalisations possible. The 13 families represented by the largest number of species are, in descending order :

Leguminosae ..	with 68 species.
Compositae ..	46 ..
Labiatae	27 ..
Gramineae	25 ..
Liliaceae	20 ..
Cruciferae	18 ..
Caryophyllaceae ..	18 ..
Umbelliferae	18 ..
Borraginaceae ..	18 ..
Ranunculaceae ..	17 ..
Orchidaceae	17 ..
Scrophulariaceae ..	12 ..
Rosaceae	11 ..

The above 13 families account for 315 species, leaving 157 to be divided amongst the other 58 families, which have less than 10 species each, 25 having only 1 each. The predominance of *Leguminosae* is striking and is partly accounted for by the very diverse habits and life-forms found amongst the 68 species, small trees, bushes, dwarf shrubs, perennial and annual herbs all occurring. The leguminous annual herbs are particularly noteworthy, since their life-histories are so obviously in accord with the climatic conditions.

Two species are described as new, *Dianthus Ingoldbyi* and *Asyneuma parviflora*. Seven new varieties are named as follows : *Althaea ficifolia* Cav. var. *chersonesensis*, *Malope malacoides* L. var. *acuminata*, *Astragalus anatolicus* Boiss. var. *parviflorus*, *Trifolium stellatum* L. var. *adpressum*, *Cotoneaster pyracantha* Spach var. *aurantiaca*, *Cerinthe minor* L. var. *hispida*, *Orchis tridentata* Scop. var. *chersonesensis*. Three new combinations are made : *Delphinium subvelutinum* Heldr. ex. R. Buser var. *transiens* (Hal.), *Limonium vulgare* Mill. var. *macroclada* (Boiss.), *Carex flacca* Schreb. var. *cuspidata* (Aschers. et Graebn.).

The figures used to indicate distribution have the following significance given to them : The Rôman figures : I. Cosmopolitan or practically so. 1a. Old World. II. North Temperate. III. East North Temperate. IV. General European. V. Mediterranean Regional. VI. Mediterranean (Basin). VII. Western Mediterranean (Basin). VIII. South European. IX. Italian. X. Eastern Mediterranean (Basin). XI. Oriental. XII. Central European. XIII. Dacian. XIV. Pannonian. XIVa. Pontic. XV. Alpine. XVI. West North African. XVII. Egyptian. XVIII. Caucasian. XIX. Balkan Peninsular. XX. Endemic (to the Balkan Peninsula). A full explanation and discussion of these figures it is hoped will appear in a later work. For the purposes of the present paper it may be accepted that the centre of distribution or main area of the species is indicated by the figure given in any instance. The Arabic figures indicate the regions within the Balkan Peninsula where the species occurs : 1. Crete. 2. Greece south of Thessaly. 2a. Cyclades. 3. Thessaly. 3a. Olympus massif. 3b. Pindus. 4. Epirus. 5. Albania. 6. North Macedonia. 6a. South Macedonia. 6b. Athos Peninsula. 7. Thrace. 7a. Imbros, Lemnos and Samothrace. 8. North Bulgaria. 8a. South Bulgaria (Eastern Rumelia). 8b. Rhodope massif. 9. Dobruja. 10. Serbia. 10a. Sandjak of Novipazar. 11. Montenegro. 12. Bosnia. 13. Herzegovina. 14. Dalmatia. 15. Croatia. 16. Istria.

The letters B.P. wherever used in this paper should be read Balkan Peninsula, a less ambiguous phrase than "the Balkans."

Ecologically and floristically the flora of the Gallipoli Peninsula is Mediterranean as contrasted with Central European. It would, indeed, be difficult to find a more typical Mediterranean flora, as the results, given below, of a careful analysis indicate. It is interesting to note that Capt. Ingoldby records two types of vegetation which are very characteristic of the Mediterranean flora proper. His "Type I." is certainly the maccie, and "Type II." pseudomaccie merging into phrygana in places. As in so many other parts of the Mediterranean Region, there is now no true forest. While for many parts of the Balkan Peninsula I have definite evidence of forest destruction directly or indirectly by man's activities, details of this are not available for the Gallipoli Peninsula, and it is only by analogy that I assume that the Peninsula was formerly more wooded than it is now.

In the following account of the geographical distribution of the constituents of the flora of the Gallipoli Peninsula as recorded in this paper, I have used a portion of a scheme which I prepared some years ago, and have applied, in work not yet published, to the flora of the whole Balkan Peninsula. For the purposes of this paper, where a species has a distribution extending into two or more geographical districts, as here delimited, but does not extend over a sufficient area to be included under a more general and extensive category, I quote and use in calculations the two or more designations for the respective districts. In fact, every

species would appear to have a distribution different from and independent of every other species. An analogy may be found in the process of gaseous diffusion in a mixture of gases. It follows that statistics concerning the geographical distribution of species are difficult to manipulate with sufficient accuracy, even when the full details for individual species are available, which they rarely are. However, a number of generalisations which have been made concerning the plants dealt with in this paper, appear to be worthy of publication. I have included in the figures those varieties whose distribution is given in the Systematic List.

Twenty-four species are regarded as cosmopolitan (I.), meaning that they occur in both the Old World and the New, and both north and south of the Equator. Some of these are weeds of cultivated land or of waste places (camp followers) and owe their wide distribution to man's activities. A few are maritime or marsh plants. Similar remarks apply to the one species limited to but widely spread in the Old World (I.a.) and the 9 species limited to the North Temperate Zone (II.), and, in a lesser degree, to the 61 species spread through the East North Temperate Sub-Zone (III.). Amongst the last class there are a number which have a quite natural wide distribution and show a number of geographical "varieties" in different parts of their distributional area, although these are not sufficiently isolated or morphologically characterised, or have not yet been sufficiently collected and studied, for them to be considered as separate species. Twenty-five species occur widely in Europe (IV.), excluding only the Arctic parts, but most of these extend also into another of my divisions.

The majority of the species have a distribution which I name Mediterranean Regional (V.), that is, they extend throughout all or most of the Mediterranean Botanical Region, from the Atlantic Islands, Spain and N.W. Africa to Mesopotamia, Persia and even to Sind; or Mediterranean (VI.), that is, are widespread only through the countries bordering the Mediterranean Sea. It is interesting to note that the respective figures, 128 for V. and 110 for VI., are nearly equal. Only one species, *Trifolium isthmocarpum* Brot., is Western Mediterranean (VII.), and this has been recorded previously from as far east as Sicily, but not from Greece; it will possibly have to be moved eventually to VI. Five species are South European (VIII.) in their distribution. No species in the list are Italian (IX.), that is limited to Italy and the Balkan Peninsula. Sixty-one species are Eastern Mediterranean (X.) that is to say are found only in the countries touching the Mediterranean Basin from Italy eastwards. Thirty-eight are Oriental (XI.) in their distribution, having their centre to the east of the B.P. but extending westwards to it and eastwards beyond the Mediterranean Basin proper. Fifty species, in addition to those of wider distribution, occur in Central Europe (XII.), but not one of these is limited to this region and the B.P. This is a negative point which further emphasizes the Mediterranean

character of the flora of the Gallipoli Peninsula and incidentally the validity of the Mediterranean Botanical Region. Ten species are designated Dacian (XIII.), but only one of these solely so. Three are termed Pannonian (XIV.) and 14 Pontic (XIVa.), but none of the former and only one of the latter are limited to these categories. Six occur in the Caucasus (XVIII.), but not only there outside the B.P., in addition to more widely spread species which also occur there. Fourteen have their centre of present distribution most definitely, and probably had their place of origin, in the B.P. (XIX.). Twelve are, so far as is yet known, endemic to the B.P., this figure not including the 2 or 3 species, which I have only seen from the Gallipoli Peninsula. *Dianthus Ingoldbyi* and *Astragalus Durhamii* are only known from the Gallipoli Peninsula, while the area of distribution for *Asyneuma parviflora* is, somewhat doubtfully, extended into northern Asia Minor, and *Delphinium aconiti* almost certainly occurs on both sides of the Dardanelles Straits. In addition a number of the varieties, described as new in this paper, are not yet known outside the Gallipoli Peninsula.

The predominating Mediterranean type of flora in the Gallipoli Peninsula is very evident from the above summary. Another calculation makes this fact even clearer. Since the Categories V., VI., VIII., X., and XI., and, for this paper, XIX. and XX., all indicate that a species placed in them is Mediterranean in the sense that its distribution is limited to or decidedly centred in the Mediterranean Botanical Region, it is interesting to note that the species placed in at least one of these, and adding the newly described endemics, number 370. That is only 86 species and well marked additional varieties cannot be termed characteristically Mediterranean in the known flora of the Gallipoli Peninsula, and the great majority of these are widespread species.

The distribution within the B.P. of each species recorded here has been carefully worked out, so far as reliable data are available. It is not proposed to deal in this paper with the problems raised, but the distribution of a number of species calls for special comment. *Alyssum smyrnaeum* C. A. Mey. has in the B.P. hitherto only been recorded from Greece. *Trifolium isthmocarpum* Brot. is new to the B.P. *Rubia Olivieri* Rich. in the B.P. has only been known from Crete and Greece. *Anacyclus clavatus* Pers. in the B.P. has not been found outside Greece and Dalmatia. *Centaurea spinosa* L. and *Echium elegans* Lehm. have not been recorded hitherto in the B.P. outside Crete, Greece and the Cyclades. *Centaureum subspicatum* (Vel.) Ronn. has only been recorded from Bulgaria. *Hyoscyamus reticulatus* was indicated by Linnaeus for Crete but has not been mentioned by recent authors from the B.P. *Micromeria graeca* Benth. has been known in the B.P. only from Crete, Greece and Corfu. *Polygonum tenuiflorum* Presl has been recorded for the B.P. only from the Dobruja. *Cephalanthera cucullata* Boiss. et Heldr. has only been known from Crete. *Tulipa Hageri* Heldr. has been recorded only

from Greece and *T. praecox* in the B.P. only from Croatia, and doubtfully from Greece, but much taxonomic work remains to be done on the tulips before we can be sure of their distribution.

The following nine species, including three already recorded in the *Kew Bulletin* and in addition to the two new species described in this paper, are new to Europe: *Dianthus lydlus* Boiss., *Astragalus anaticus* Boiss. (represented by the var. *parviflorus* Turrill), *A. Durhamii* Turrill, *A. trojanus* Stev., *Gonocytisus angulatus* Spach., *Genista anatolica* Boiss. (since collected in the East Rhodopes), *Hedysarum varium* Willd., *Onobrychis cana* Hand.-Mazz. and *Convolvulus pilosellaeifolius* Desr.

Sixty-four species and 3 varieties are recorded for the first time, so far as I know, from Thrace, in addition to the new ones here described.

(To be continued.)

XXXV.—MISCELLANEOUS NOTES.

DR. H. MARTIN LEAKE.—We learn that Dr. H. Martin Leake, Sc.D., F.L.S., has been appointed Principal of the Imperial College of Tropical Agriculture, Trinidad, and Imperial Commissioner of Agriculture for the West Indies, in succession to Sir Francis Watts, K.C.M.G., D.Sc., on his retirement this autumn. (K.B. 1904, p. 13).

LIEUT.-COLONEL A. T. GAGE, I.M.S., M.A., B.Sc., M.B., F.L.S., Director, Botanical Survey of India and Superintendent, Royal Botanic Garden, Calcutta, has been appointed Librarian and Assistant Secretary to the Linnean Society of London.

MR. C. E. J. BIGGS, B.Sc., has been appointed Assistant Agricultural Officer, Uganda.

RETIREMENT OF MR. J. H. MAIDEN.—We are informed by Mr. J. H. Maiden, I.S.O., F.R.S., F.L.S., that his resignation from the posts of Director, Botanic Gardens, Sydney, and Government Botanist, New South Wales, has been accepted and can only regret very much the termination of his long connection with the Sydney Botanic Gardens. Mr. Maiden received his first public appointment in New South Wales in 1881 and after holding various posts was appointed Director of the Botanic Gardens and Government Botanist in 1896. He has for many years been identified with Australian botany, on which he is an acknowledged authority. In 1915 he was awarded the Linnean Medal by the Linnean Society, and in 1916 he was elected a Fellow of the Royal Society.

We look forward to the completion of his valuable "Critical Revision of the genus *Eucalyptus*" during his years of retirement.

HARRY JAMES VEITCH.—Sir Harry Veitch was born at Exeter in 1840, and died at East Burnham Park, Slough, on July 6th last. He was educated at Exeter and at Altona, near Hamburg, and later on went to Paris to work with the great firm of French seedsmen, Messrs. Vilmorin-Andrieux and Co. In 1858, he joined his father at Chelsea in conducting the nursery business which had been taken over from Messrs. Knight and Perry five years previously. From that time until 1913-14, when he retired and the firm of James Veitch and Sons came to an end, he was (except for a short interval during which his nephew, the late J. H. Veitch, became manager) actively engaged in the business which, under his and his father's control, acquired and retained to the end a position of undoubted pre-eminence. It is safe to say that in the annals of English horticulture no career has ever equalled that of Sir Harry Veitch in combined length, activity and importance. Even after his retirement, when private business matters no longer occupied him, his interest in horticulture and especially in the Royal Horticultural Society remained as keen as ever. As lately as 1918, at a very difficult time, he undertook the office of Treasurer to that Society.

For very many years, dating back indeed to the time of Sir William Hooker's directorship of Kew, pleasant and close relations existed between this establishment and the Messrs. Veitch. This was naturally the case considering that for many years the firm was the most active agent in Britain or in Europe engaged in introducing new plants from abroad. Many of the most interesting and beautiful plants now in Kew, both out-of-doors and under glass, we owe to the enterprise of this firm. Whilst in no sense a botanist himself, Sir Harry helped to further the interests of science by allowing his plant collectors to make herbarium material of vegetation in the regions they visited. Mr. E. H. Wilson's collections of dried plants, for example, made during his journeys in Central and Western China in the early years of this century, were of particular interest. Of these, two complete sets were presented to Kew.

After 1864, when Richard Oldham, the last Kew collector, died at Amoy, the influx of new plants to Kew became less systematic than it had been in earlier days. Still, the numerous Botanic Gardens and private correspondents abroad with whom this establishment had relationships were the means by which many new plants were introduced to cultivation. Thus Kew was often able to effect exchanges with the Veitch's on more or less level terms, although it must be said that Sir Harry's kindly feeling towards the place never made a *quid pro quo* really necessary.

It would be impossible to record here the whole of the important plants introduced to cultivation under his auspices. The expeditions of Mr. E. H. Wilson to China are comparatively recent history. Previous to them, journeys by John Gould Veitch in Japan, Charles Maries in China and Japan, Richard Pearce in Chile, David Bowman in Brazil, J. H. Chesterton, G. Wallis and

W. Davis in South America, P. C. M. Veitch and F. W. Burbidge in Borneo, and C. Curtis in Madagascar and the East Indian Islands were some, but not all, of the enterprises undertaken by the firm during the period when Sir Harry was at the helm.

Nor could any account, however brief, of his activities omit mention of the great work in hybridization carried on under his direction. Orchids (in the hybridization of which the firm were the pioneers), *Nepenthes*, *Hippeastrums*, East Indian *Rhododendrons* and *Begonias* are but the chief genera on which his talented helpers worked with such success. Two literary works were published whilst Sir Harry was head of the firm: "The Manual of *Coniferae*" (1881) of which a second edition was issued in 1900, and "The Manual of *Orchidaceous Plants*" (1887-94). Besides being of real scientific value, both of them are particularly interesting because of the information the firm was able to supply about the habits and history of so many of the plants dealt with—information obtained at first hand from their own collectors and in many instances not otherwise obtainable.

W. J. B.

A Pinetum near Canterbury.—About seventeen years ago, Mr. Neville Cooper, son of the famous animal painter Sidney Cooper, R.A., commenced the formation of a collection of conifers at Little Hall, St. Stephens, about $1\frac{1}{2}$ miles out of Canterbury. The situation, some 250 feet higher than Canterbury itself, with a deep loamy soil, has proved very suitable, and the trees have made excellent growth. Mr. Cooper's residence is now at Vernon Holme, Harbledown, also a short distance out of Canterbury. Here also he has planted his favourite trees, and, although few in number as compared with the collection at Little Hall, they are equally robust in health. In the two places together a very interesting and comprehensive selection of *Coniferae* has been assembled.

The firs (*Abies*) are especially fine and healthy, and the genus is represented by a large number of good specimens. More conspicuous than any, perhaps, are *Abies concolor* and its ally *A. Lowiana*, both notable for the vividly glaucous tints of their foliage and vigorous growth. The rare *A. bracteata*, over 20 feet high, is in first-rate condition and so is *A. Webbiana*, about as tall. *A. recurvata*, the new Chinese species so well named and so well characterized by its strongly recurved leaves, is growing well, as is also the rare *A. sibirica*, so infrequently seen in good health, but here 9 feet high. Of the commoner species, such as *A. brachyphylla*, *A. cephalonica*, *A. firma*, *A. numidica*, and *A. Veitchii* there are excellent examples.

The spruces (*Picea*) are not inferior in interest to the firs. *Picea polita*, with its rigid, cast-iron-like leaves, makes a handsome tree. Of *P. pungens* var. *glauca* there are numerous specimens, justifying more than ever the popular name of "blue spruce", and growing at a remarkable slant are several plants of the var.

prostrata. Seeing the typical green *P. pungens* as it is here, one could not but feel that this tree has been unduly neglected for its more showy variety. Possibly no one in England has *P. Breweriana*, that rare tree confined in a wild state to a few localities on the Siskiyou Mountains of California and Oregon, better represented than Mr. Cooper. Of several trees in his collection the largest is about 12 feet high. Although it is not so tall as the original specimen introduced to this country (now growing near the Pagoda at Kew) it is not likely, in view of its advantages as to climate and soil, long to remain inferior in stature. *P. Omorica*, the Serbian spruce, thrives excellently here, as, indeed, it does in most places, but Mr. Cooper has a distinctly "weeping" form which we have not seen elsewhere, nor is it mentioned by Dallimore and Jackson in their new book on conifers. As a purely ornamental tree of garden origin, nothing either at Little Hall or Vernon Holme is perhaps quite equal to *Picea orientalis* var. *aurea*, the entire young growth of which is a rich glowing yellow; one tree is 25 feet high. The true *P. Engelmannii*, whose name is so often given to *P. pungens*, is represented by several good specimens.

Of the numerous forms of Lawson cypress, Mr. Cooper has an excellent selection, amongst which was noted as especially well coloured, *C. Lawsoniana* var. *Stewartii*—a very good golden yellow. Another variety distinct in its slender pyramidal shape is var. *Drummondii*, apparently a better hardy substitute for the Italian Cypress than the old variety *erecta viridis*, yet it does not appear to be much known.

Other interesting conifers satisfactorily represented in the collection are *Pinus Balfouriana*, *P. flexilis*, *P. Koraiensis*, *Tsuga Brunoniana*, *Pseudotsuga Douglasii* var. *Stairii* (not often seen now), *Thuja dolabrata*, *Picea retroflexa*, *Abies Pindrow*, *A. Faxoniana*.

The only previous notice of this interesting collection that has appeared was published in the "Gardeners' Chronicle" of May 11th, 1907, p. 305, and the Director and I were very pleased to be able to avail ourselves of Mr. Cooper's kind invitation to visit his Pinetum.

W. J. B.

The Botanical Magazine.—The plants figured in Vol. cxlix (1923) Part iii, which has recently been published, are *Rhododendron calostrotum* Balf. f. (t. 9001), from the alpine zone of North-East Burma; *Boykinia tellimoides* Engl. & Irmischer (t. 9002), a native of the mountains of South and Central Hondo, Japan; *Veronica canescens* T. Kirk (t. 9003A), from South Island, New Zealand; *Cassiope selaginoides* Hook f. & Thoms.—*forma nana* (t. 9003B), which occurs in Sikkim and Western China from the Burma-Tibet-Yunnan frontier to Szechuan; *Magnolia Wilsonii* Rehd. (t. 9004), from Szechuan; *Pentas coccinea* Stapf (t. 9005), a new species, allied to *P. zanzibaricae* Vatke, found on the East African Coast and its Hinterland from the Tanga river to Usambara.

and also in the Island of Zanzibar; *Lysionotus pauciflorus* Maxim. (t. 9006), a native of S. China and the Yangtse basin, Formosa and the Southern Islands of Japan; *Spencera ramalana* Trimen (t. 9007), an interesting Rosaceous herbaceous plant from Szechuan and Yunnan; *Photinia Davidiana* Cardot (t. 9008), an evergreen shrub also from Szechuan and Yunnan; *Chamaebuxus Vayredae* Willk. (t. 9009), a native of the dry hills in the district of Olot, Catalonia, Spain; *Pimelea prostrata* Willd. (t. 9010), from New Zealand; *Dendrobium laevifolium* Stapf (t. 9011), a new species resembling *D. asperifolium* J. J. Smith, from the hills of Rossell Island in the Louisiades Archipelago near New Guinea and *Centradenia floribunda* Planchon (t. 9012), a native of Guatemala and Western Honduras.

Flora of South Australia, Parts I and II.—The South Australian Branch of the British Science Guild are to be congratulated on the work they have undertaken in preparing a series of "Handbooks of the Flora and Fauna of South Australia."

With regard to the Flora, two out of the three parts which will deal with the vegetation have now been published; Part I commences with the *Pteridophyta* and, following Engler and Gilg's "Syllabus der Pflanzenfamilien", includes the *Gramineae*, *Cyperaceae*, *Liliaceae*, *Orchidaceae* and other families of Monocotyledons. Part II deals with the Dicotyledonous families from *Casuarinaceae* to *Euphorbiaceae*, including such important Australian families as *Chenopodiaceae*, *Proteaceae* and *Leguminosae*.

The Flora is the work of Mr. J. M. Black, except for the *Orchidaceae* which have been contributed by Dr. R. S. Rogers.

The work is well printed and illustrated by numerous very useful botanical text figures, all of which, with the exception of the orchids—drawn by Miss R. C. Fiveash—are the work of Mr. Black.

Mr. Black has been careful to consult the herbaria in Australia in preparing his Flora and has wisely included the well-established alien plants along with the plants native to Australia, preceding the names of any such aliens with an asterisk. In this way the Flora will be of the fullest value for students, plant lovers and those engaged in Agriculture who wish to know about the native and naturalised plants of the State.

In Part I there is a short introductory chapter giving the History of Botany in South Australia which is followed by a very useful "Glossary of Botanical Terms." A key to the families and a scale of measurements precedes the actual flora and in all these respects the work will prove of great value.

Keys are given under each family to the genera and under each genus to the species so that anyone with a slight knowledge of Botany should be able to identify the plants of the State.

Short descriptions are given of each species, often accompanied by excellent text figures, and the author has been careful to give explanations or translations of all the generic and specific Latin

or Greek names. The localities on broad-lines and the times of flowering and some general biological details of the species are also given.

It is very gratifying to find a piece of work so well done and to be able to congratulate the author on the preparation of so useful a Flora, which should serve as a model to the other Australian States of the way in which a local flora should be prepared.

Rice.*—Under this title Dr. Copeland has recently contributed a useful, well-printed book. After a necessarily brief account of the plant *Oryza sativa* itself, its range of varieties and economic physiology, the author devotes a short chapter to the agricultural properties of this greatest of the world's crops, and a lengthy one then succeeds on its diseases and pests, the latter being illustrated by two coloured plates. It is explained in the Introduction that there are probably more cultivated varieties of Rice than of all the other cereals put together: it is therefore not surprising that no attempt is made in this book to describe or even enumerate all the varieties, but Chapter iv. includes a general account of the range of variation both morphological and physiological, and a skeleton key to groups of varieties is presented, as well as a very brief account of the results of "pure line" selection. We are informed also that only a single case is known of obtaining a hybrid of economic importance, nevertheless the technique of artificial pollination is fairly fully described. Workers in this field will await with interest the evolution of a workable key to the actual agricultural varieties which the author promises in the course of the next few years. Some idea of the labour entailed in this and in unravelling the intricate problem of synonymy which is inseparable from it, can be formed when it is remembered that about eight thousand varietal names have been recorded from India alone, while the number of Chinese varieties is not even guessed at. The author points out that he has dealt more particularly with cultivation of this crop in the United States and in the Philippines, on the grounds that it is preferable to deal with the crop as found in the areas most familiar to him.

However, in the seventh chapter, entitled "Rice in other lands", useful notes will be found under the respective countries in the Old World where the area under the crop is so many times greater than in the New.

A good index is provided, but there is no Bibliography. In a semi-popular work perhaps the latter is hardly essential, but it would certainly add very greatly to the value of the book, which should command a large sale.

C. V. B. M.

*By Edwin Bingham Copeland. Macmillan & Co., London, 1924, 8vo., pp. 352, 27 plates. Price £1.